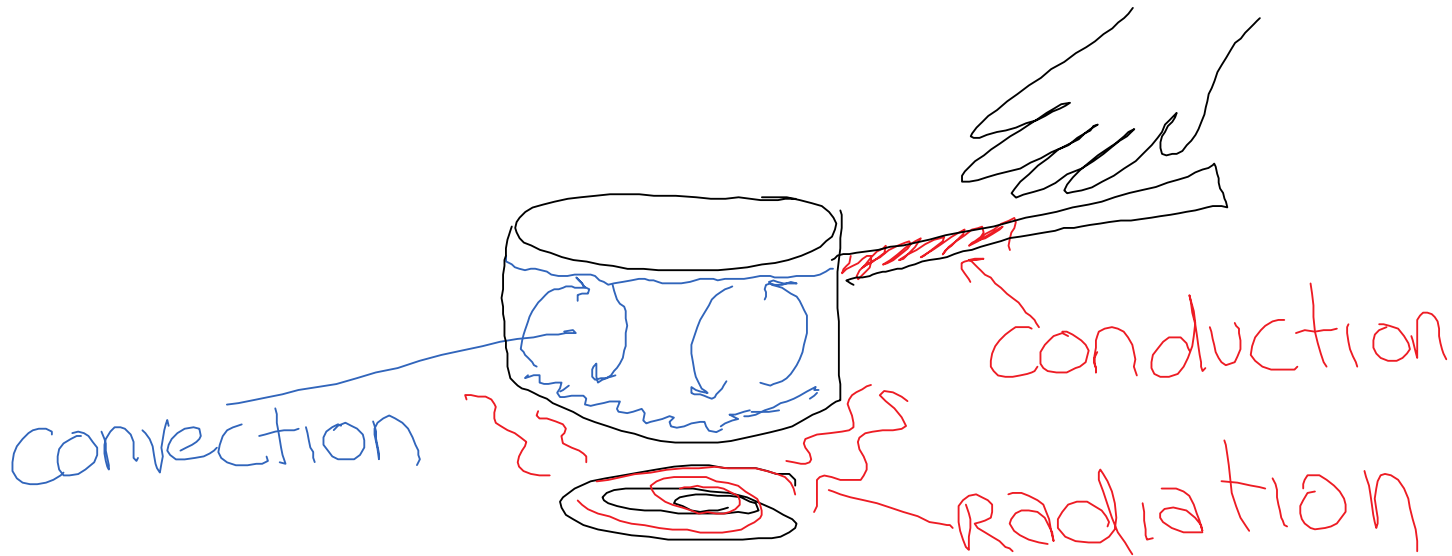


Heat Transfer



Conduction

- Transfer of kinetic energy through collisions of particles
- Objects must be touching

Convection

- Areas of liquid get warmer, rise to cooler areas
- Cooler liquid falls to take its place
- CIRCULATION transfer heat energy

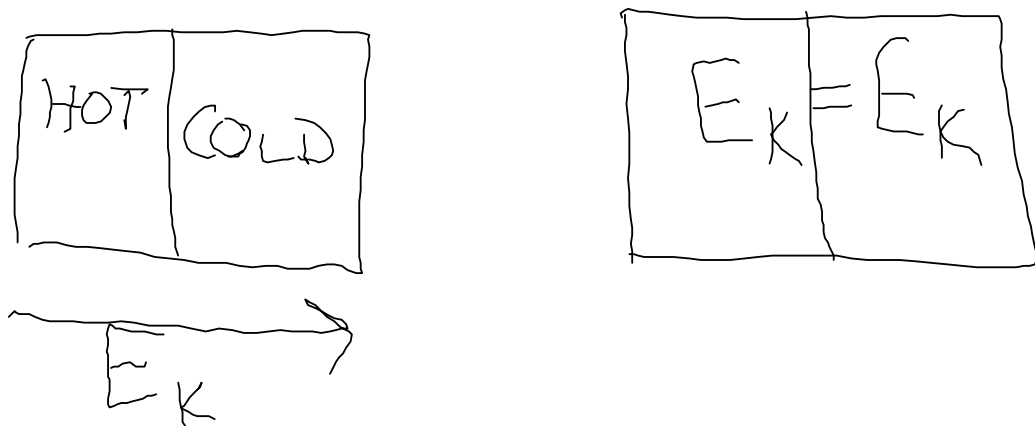
Radiation

- Thermal energy becomes electromagnetic energy
- Electromagnetic waves traveling at the speed of light transport energy

Conduction and convection depend on the presence of matter

Thermal equilibrium

- The condition under which 2 substances in physical contact exchange no heat energy (i.e. are the same temperature)



Thermometer

- Measures temperature
- In contact with object, comes to thermal equilibrium

Kelvin = Celsius + 273.15

0 Kelvin - absolute zero

- All thermal energy removed, no motion of particles

Specific heat (c)

- Amount of energy that must be added to raise the temperature of a unit mass one temperature unit
- J/kg K or J/g C
- $Q = mc\Delta T$

Example:

Gold has a specific heat capacity of 0.129 J/gC. How many joules of heat energy are required to raise the temperature of 15 grams of

gold from 22 to 85 degrees Celsius?

$$Q = mc\Delta T$$
$$= (15g)(0.129 \text{ J/g}^\circ\text{C})(63^\circ)$$
$$Q = 120 \text{ J}$$